SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 7, 1907.—"Further Results of the Experimental Treatment of Trypanosomiasis in Rats: being a Progress Report of a Committee of the Royal Society." By H. G. **Plimmer** and J. D. **Thomson**. Communicated by Sir Ray Lankester, K.C.B., F.R.S.

The following results carry the work, part of which has been already described, on to October 24, 1907.

Rats treated with atoxyl and mercury are still living and well at 229, 222, 208, 178, 164, and 63 days after inoculation; and a rat treated with atoxyl and iodipin is alive at 218 days.

The principal pathological lesion in rats which have been treated with atoxyl and some compound of mercury and have lived for a very long time after inoculation, apparently cured of the disease, is a degeneration of the kidneys; and in most of these rats this was the only lesion found *post mortem*.

Considering both the experiments already recorded which have since ended fatally, and the more recent and —as regards dosage—bolder experiments, the authors are bound to conclude that, in small animals at any rate, mercury has not given altogether satisfactory results. Perhaps it may be a question of dosage; they have, however, tried to enlarge the range of dosage as far as possible, from homœopathic to large ones, without attaining a large percentage of cures. If the dose of mercury be sufficient to aid the atoxyl, they have found, in those cases which have died, chronic kidney, and in a less degree liver, lesions, which seem to be the late result of those more acute changes which have been found in those animals that have died earlier, either from disproportionate dosage, or from some want of resistance to the drug.

Potassium antimonyl tartrate has been tried, and this was found to be fatal to rats in doses of 1 centigram. The trypanosomes were observed to be greatly diminished in numbers, but it was also noticed that soon after the injection the rats appeared to be very ill. This was attributed at the time to the potassium in the compound; probably erroneously, as a similar effect has been noticed in rats treated with the compound described below, when the number of trypanosomes in the blood was very great. The symptoms may have been due to the dissolution of so large a mass of trypanosomes. But they suggested the use of the sodium compound—sodium antimonyl tartrate—with which many experiments have been made.

This substance in 1 per cent. solution is that which, of all the various bodies tried, including atoxyl, has the most marked influence upon trypanosomes in the living body. Although the experiments with it are not many, or of long duration, the results so far seemed sufficient to induce the authors to direct the attention of other workers in this field to it.

The question of dosage is still under observation. The authors have tried many ways, and at present are inclined to think that a full dose (*e.g.* 0·5 c.c. of a 1 per cent. solution for a rat of 200 grams or over) should be given when the trypanosomes are fairly plentiful in the blood, and then repeated at intervals of one, two, and three days, up to about four doses, and thereafter in weekly doses for a month. But they have good results in cases in which a dose has been given on four successive days, also when given every other day, and so on up to once every five days, without any recurrence up to as many as 52 days; but of two cases dosed at five-day intervals, one has recurred and one has not.

The quickness of the action of sodium antimonyl tartrate is remarkable. In one rat, the blood of which was swarming with trypanosomes, a dose of 0·35 c.c. of a 1 per cent. solution caused their entire disappearance from the blood within half an hour; and in two other cases, in which the blood contained very large numbers of trypanosomes, after injection of 0·33 c.c., only a few could be found at the end of half an hour, and in one after an hour none could be found, and in the other only one in an ordinary blood preparation. A few trypanosomes can sometimes be found in the liver, and these are extremely active, and in no way inconvenienced by the drug; whether these are the forms which can persist, and need to be tired out by successive doses, cannot be said at present, but their extreme activity, when all the others have disappeared, is suggestive. The authors have not detected any morphological differences in them.

A guinea-pig, moribund with sleeping-sickness, with œdema of eyelids and genitals, entirely unable to stand, and with a large number of trypanosomes in the blood, was given, on September 16, 0·5 c.c. of a 1 per cent. solution; on September 17 the trypanosomes had entirely disappeared, and 0·75 c.c. was given; on September 19 the animal to all appearances was quite well, and on this day and on September 21 and 26, 1 c.c. was given. The œdema disappeared and it continued to look well, and showed no more trypanosomes. It lived until October 14, when it died; *post mortem* the organs were congested and the kidneys were inflamed, and the urine in the bladder contained albumen. The fact that the guinea-pig was moribund when the treatment was commenced may reasonably account for the pathological conditions.

Of 36 rats treated with sodium antimonyl tartrate, 11 have died, 6 not of the disease, and there remain alive and well: 3 of 52 days, 1 of 49, 7 of 44, 8 of 43, 4 of 31, and 2 of 21; and of these 25, 23 have had no recurrence.

With the view of ascertaining what amount of immunity, if any, had been conferred on an animal which was considered to be cured, a nagana rat was taken which was inoculated on May 13, and had been afterwards successfully treated with atoxyl and succinimide of mercury, and in which no trypanosomes had been found since it had its first dose on May 16, when the trypanosomes were very plentiful in the blood. On October 7, the 147th day, the rat was re-inoculated from another nagana rat, and on October 11 trypanosomes were present in numbers in the blood; a dose of sodium antimonyl tartrate was given, and no trypanosomes have been seen since October 12. This seems to point to the fact that no immunity is conferred.

December 12, 1907.—"Magnetic Declination at Kew Observatory, 1890–1900." By Dr. C. **Chree**, F.R.S.

The paper deals with the phenomena exhibited by the magnetic declination at Kew from 1890–1900. The magnetograph curves have been measured on every day of this period, whether disturbed or undisturbed, and the data from days of the different species are contrasted. Diurnal inequalities are got out for ordinary days, excluding those of large disturbance, and separately for the highly disturbed days, and the differences between these, and the points wherein they differ from the corresponding inequalities from *quiet* days, are investigated.

The disturbed days show a well-marked regular diurnal variation, which differs in many notable respects from that observed on ordinary days.

When the inequalities are analysed in Fourier series, it is found that the difference mainly centres in the twenty-four-hour term, the amplitude and phase of which seem both largely influenced by disturbance. The variations in the phenomena presented by disturbances throughout the year are investigated from several points of view.

The *absolute range* of the declination (absolute maximum less absolute minimum) was determined for every day of the eleven years, and special attention is given to the variation of this quantity throughout the year, and from year to year. With the view of throwing light on the theories of Arrhenius, Maunder and others, on the origin of magnetic storms, a minute comparison is made of the relationship between the absolute ranges and (Greenwich) sun-spot areas throughout the eleven years. Whilst the results do not preclude the possibility that Arrhenius's theory may be true of a certain number of magnetic storms, they seem to indicate that it cannot be a complete explanation of the facts.

Chemical Society, December 19, 1907.—Sir William Ramsay, K.C.B., F.R.S., president, in the chair.—

Attempted synthesis of $\begin{matrix}\beta\text{—N—}\beta\\ |\\ \beta\text{—CH—}\beta\end{matrix}$-dinaphthacridine; condensation of methylene dichloride and 1-substituted-2-naphthylamines: A. **Senier** and P. C. **Austin**. By condensing methylene dichloride with derivatives of β-naphthyl-

amine in which the hydrogen of the α-position adjacent to the amino-group had been substituted by a halogen, either Reed's dinaphthacridine or a meso-derivative thereof was formed, thus completing the proof that this base has the constitution assigned to it.—Cobaltamine compounds (preliminary note): C. E. **Groves.** Carycino-cobaltamine carbonate is produced when freshly precipitated cobalt carbonate suspended in dilute ammonia is agitated with air and then exposed to the air for three or four days, in the form of bright crimson crystals. When the crimson carbonate is treated with excess of nitro-hydrochloric acid it is ultimately converted into "bluish-black" crystals. A bronze-green nitrate is prepared by gradually adding a solution of cobalt nitrate in dilute nitric acid to a mixture of dilute ammonia with a solution of ammonium persulphate, and, after it is thoroughly oxidised by shaking it with air, acidifying the mixture with dilute nitric acid. The bronze-green hydrochloride is easily obtained from the nitrate by heating the latter with dilute hydrochloric acid. A grass-green compound obtained from purpureo-cobaltic chloride is also described.—The direct interaction of aryl halides and magnesium: J. F. **Spencer** and Miss E. M. **Stokes.** The authors find that the Grignard reaction between cyclic halogen compounds and magnesium powder takes place without the use of ether when the two substances are heated together. In the case of aliphatic compounds, methyl iodide, methylene iodide, and *iso*-propyl iodide were indifferent, but bromosuccinic acid gave succinic acid.—Derivatives of tetramethyl glucose: J. C. **Irvine** and Miss A. M. **Moodie.** The constitution of tetramethyl glucoseoxime, deduced from its behaviour on alkylation and the hydrolysis of the product, shows that it is produced by the reaction of the sugar in its γ-oxidic forms, and this also seems to be the case with tetramethyl glucoseanilide. It was found that the silver oxide method of alkylation can be applied to the methylation of oximes, thus furnishing a convenient method of determining the hydroxyl content of such compounds.—The characterisation of mercerised cotton. Preliminary note: J. **Hubner.** After treatment with iodine in potassium iodide, mercerised cotton becomes brownish-black, whilst cotton remains white. Similarly, non-mercerised cotton remains practically white, whilst the mercerised material becomes dark navy-blue on treatment with iodine in zinc chloride solution.—Note on the action of metallic calcium on alcohols: F. M. **Perkin** and L. **Pratt.** The statement that metallic calcium has no action on alcohol is inaccurate. With ethyl or methyl alcohol, after from thirty to sixty minutes, reaction ensues, and may become very vigorous, a calcium alkyloxide being formed.—Note on the iodates and periodates of the alkalis and the ammonium radicle: T. V. **Barker.** Specific gravity and solubility determinations of the iodates of rubidium and cæsium, and the periodates of sodium, potassium, rubidium, cæsium, and ammonium, are given.—The colour of cupric salts in aqueous solution: N. V. **Sidgwick** and H. T. **Tizard.** From the results obtained, it seems probable that ionisation affects the intensity of the colour but not the tint.—Derivatives of S-phenylphenazothionium, part i.: S. **Smiles** and T. P. **Hilditch.**—A colorimetric method for the determination of small percentages of iron in copper alloys: A. W. **Gregory.** The method is based upon the colour reaction given by salicylic acid and ferric chloride. The interfering action of the blue copper salts is overcome by the addition of a weak solution of potassium cyanide. Zinc and antimony do not interfere with the reaction, but lead must be removed as sulphate.—The effect of heat on the alkyl iodides: Z. **Kahan.**—The influence of acids and alkalis on the velocity of formation of acetoxime: E. **Barrett** and A. **Lapworth.**—Action of metallic calcium on ketones: H. D. **Law** and F. M. **Perkin.**—The so-called "tetrabromodiphenoquinone" and the constitution of cœrulignone: J. **Moir.**—A note on certain pyrogenic reactions: N. T. M. **Wilsmore** and A. W. **Stewart.**

DUBLIN.

Royal Dublin Society, December 17, 1907.—Prof G. H. Carpenter in the chair.—The separation and quantitative spectra of cerium, lanthanum, and yttrium: Dr. J. H. **Pollok** and A. G. G. **Leonard.**—The quantitative spectra of molybdenum, tungsten, thorium, and zirconium: A. G. G. **Leonard.** These two papers are in continuation of the authors joint work on the quantitative spectra of the elements, undertaken to facilitate the use of the spectroscope in its application to ordinary chemical analysis. A reproduction of the spectrum of each element was given, together with a table of the wave-lengths of the most persistent lines, Greek letters being added to indicate the order of disappearance of the lines as the quantity of the element present diminished. In the first paper an account was given of the method of separating the rare metals of the cerite group.

Royal Irish Academy, November 30, 1907.—Dr. F. A. Tarleton, president, in the chair.—The dynamics of a rigid electron: Prof. A. W. **Conway.** A rigid electrified system of any shape is in general motion. A direct calculation is made in a series of approximations of the resultant force and couple due to the internal electric forces. To the first approximation the motion is formally the same as that of a general body moving in a liquid, to the second the motion is found to be aided by a force proportional to the rate of change of the acceleration and independent of the shape. This leads to the ordinary expression for the radiated energy. The third approximation introduces the "transverse" masses. It is shown that the usual expressions for electromagnetic mass become correct if we neglect powers and differential coefficients of the acceleration beyond the first.

December 9, 1907.—Dr. F. A. Tarleton, president, in the chair.—Presidential address on the relation of mathematics to physical science: Dr. **Tarleton.**

PARIS.

Academy of Sciences, December 30, 1907.—M. H. Becquerel in the chair.—Grafting in plants containing hydrocyanic acid: L. **Guignard.** The question as to whether chemical substances secreted by the plant can pass into the graft, or *vice versa,* has been much contested. The author has grafted a plant producing a hydrocyanic glucoside on to another plant totally free from this compound, and inversely; in neither case was there any transport of the glucoside from the graft or the plant. In the artificial symbiosis produced by grafting, each species preserves its chemical characteristics and its autonomy.—Some examples of a collective reasoning in bees: Gaston **Bonnier.** A description of some interesting experiments proving the discipline and division of labour among bees.—The recent determinations of the volume of the kilogram of water: Rene **Benoit.** A *resume* of the work done at the Bureau international des Poids et Mesures by the method of contact, and methods based on the phenomena of interference. The mean of the whole of the experiments is that a kilogram of pure water, at its maximum density and under a pressure of 760 mm., measures 1·000028 cubic decimetres, with an uncertainty of about two units in the last figure.—Tables of Uranus and Neptune by Le Verrier. Rectification of the analytical theory: some new tables: A. **Gaillot.** The method followed in this re-calculation was that of Le Verrier, making use of the rectified values for the masses and elements of the orbits. A comparison of the calculated and observed positions furnishes no indication of the influence of any possible planet beyond the orbit of Neptune.—The theory of the moon: H. **Andoyer.**—Vectorial differential invariants and the theory of binary forms: E. **Waelsch.**—The decomposition of a number into a sum of eighth powers of integers: Edmond **Maillet.**—The equation $\frac{\partial^2 z}{\partial x^2} = \frac{\partial z}{\partial y}$: E. **Holmgren.**—The definition of the area of a portion of a curved surface: E. **Cartan.**—Inverse functions of integral functions: Pierre **Boutroux.**—The statics of the deformable line: Eugène and François **Cosserat.**—The variations of the absorption bands of didymium and erbium salts in a magnetic field: Jean **Becquerel.**—The spectrophotometry, viscosimetry, and electric signs of solutions: Charles **Henry.**—The specific heat and molecular field of ferromagnetic substances: Pierre **Weiss.** The hypothesis of the molecular field gives a quantitative explanation of the anomalies of the specific heats of ferromagnetic substances.—The electrolytic reduction of indigo: Henri **Chaumat.** The negative electrode

of an electrolytic cell divided by a diaphragm and containing sodium carbonate solution is formed of a mixture of indigo and graphite. The reduced indigo is dissolved by the caustic soda formed in the electrolysis, and 30 per cent. to 40 per cent. of the current is utilised.—Some thermochemical data relating to the chlorine compounds derived from Millon's base: H. **Gaudechon.**—A new method for the hydration of pinene: Ph. **Barbier** and V. **Grignard.** Pinene dissolved in acetic acid is treated with a 50 per cent. aqueous solution of benzenesulphonic acid at the ordinary temperature. Terpinol can be isolated from the products of the reaction with a yield of about one-third of the weight of the pinene taken.—The ketone derived from β-hexahydrocarvacrol: Léon **Brunel.**—Two modes of individualisation of albite in the micrographitic *massif* of Genis: Jacques **de Lapparent.**—A general method of microchemical research and its application to the study of the distribution of the saponines in plants: R. **Combes.** The method is based on the formation of an insoluble compound of the saponine with baryta, followed by treatment with potassium bichromate. Each cell in which saponine has been present is stained with barium chromate.—Tea from French colonies: J. **Dybowski.** Teas from Indo-China, compared with Ceylon teas, have a slightly higher proportion of caffeine, and about half the quantity of tannin.—The adaptation of *Orchitophrya stellarum*, a parasite of the testicles of the star-fish, to a marine medium: Casimir **Cépède.**—Ethyl chloride in the blood during anæsthesia: Lucien **Camus** and Maurice **Nicloux.** Ethyl chloride penetrates into the blood with great rapidity, and its proportion may, under certain conditions, be raised considerably without danger to the organism.—Discontinuous tetanisation: N. **Wedensky.**—Maps showing the distribution of oysters on the coasts of Vendée: M. **Guerin.**

DIARY OF SOCIETIES.

THURSDAY, JANUARY 9.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Cost of Electrical Power for Industrial Purposes: J. F. C. Snell.

MATHEMATICAL SOCIETY, at 5.30.—A Formula in Interpolation: C. S. Jackson.

FRIDAY, JANUARY 10.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Photographs of Comet *d* 1907 (Daniel): Max Wolf.—(1) Note on the Comparative Eccentricities of Visual and Spectroscopic Binary Stars; (2) On the Orbits of ξ Bootis (Σ 1888); β 80; β 513=48 Cassiopeiæ; β 552=11 Orionis; and β 524=20 Persei: T. J. J. See.—Note on the Simple Equation which comprises the Theory of the Fundamental Instruments of the Observatory: Sir R. S. Ball.—Ephemeris of Flora near the Time of Opposition in 1908: A. M. W. Downing.—(1) Occultations of Stars by the Moon, observed in the Year 1907; (2) Observations of Saturn's Ninth Satellite, Phœbe, from Photographs taken with the 30-inch Reflector in 1907: Royal Observatory, Greenwich.—On an Improved Illumination of the Field in a Transit Instrument, and its Effects on the Discordance in Reversed Positions of the Instrument: Sir W. H. M. Christie and H. A. H. Christie.—The Perturbations of Halley's Comet in the Past. Second Paper: The Apparation of 1222: P. H. Cowell and A. C. D. Crommelin.—*Probable Paper:* Proper Motions of Faint Stars in the Pleiades: F. J. M. Stratton.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Principles of Engineering Geology: Dr. Herbert Lapworth.

MONDAY, JANUARY 13.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Among the Volcanoes of Guatemala and St. Vincent: Dr. Tempest Anderson.

TUESDAY, JANUARY 14.

ROYAL INSTITUTION, at 3.—The Internal Ear of Different Animals: Dr. Albert A. Gray.

ZOOLOGICAL SOCIETY, at 8.30.—Description of a Biological Expedition to Birket el Qurun: Dr. W. A. Cunnington.—The Duke of Bedford's Zoological Exploration in Eastern Asia. VI. List of Mammals from the Shantung Peninsula, N. China: O. Thomas, F.R.S.—On the Musculature and other Points in the Anatomy of the Engystomatid Frog, *Breviceps verrucosus*: F. E. Beddard, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—*Continued discussion:* Keyham Dockyard Extension: Sir Whately Eliot.—Keyham Dockyard Extension; Temporary Works, and Plant and Appliances used in Construction: G. H. Scott.

WEDNESDAY, JANUARY 15.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—Ordinary Meeting.—At 7.45.—Annual General Meeting.—Presidential Address on "Map-Studies of Rainfall": Dr. H. R. Mill.

ENTOMOLOGICAL SOCIETY, at 8.—Annual General Meeting.

SOCIETY OF ARTS, at 8.—Screen-Plate Processes of Colour Photography: Dr. C. E. Kenneth Mees.

ROYAL MICROSCOPICAL SOCIETY, at 8.—On the Microscope as an Aid to the Study of the Biology of Insects with special Reference to the Food: W. Wesché.—Improved Type of Mercury Vapour Lamp for use with the Microscope: J. E. Barnard.

THURSDAY, JANUARY 16.

ROYAL SOCIETY, at 4.30.—*Probable Papers:* Alternate Current Measurement: Dr. W. E. Sumpner.—Prominence and Coronal Structure: Dr. W. J. S. Lockyer.—The Conversion of Diamond into Coke in High Vacuum by Kathode Rays: Hon. C. A. Parsons, C.B., F.R.S., and A. A. Campbell Swinton.—And other Papers.

ROYAL INSTITUTION, at 3.—The Building of Britain: Prof. W. W. Watts, F.R.S.

INSTITUTION OF MINING AND METALLURGY, at 8.

SOCIETY OF ARTS, at 4.30.—Indian Agriculture: Henry S. Lawrence.

LINNEAN SOCIETY, at 8.—(1) Brassica Crosses, illustrated by lantern slides: (2) Notes on Wild Types of Tuber-bearing Solanums, illustrated by lantern slides: A. W. Sutton.—Revision of the genus Illigera, Blume: S. T. Dunn.—New Coniferæ of Formosa: Bunzō Hayata.

CHEMICAL SOCIETY, at 8.30.—Colour and Constitution of Azo-compounds. Part II. The Salts of *p*-Hydroxyazo-compounds with Mineral Acids: J. J. Fox and J. T. Hewitt.—The Oxidation of Aromatic Hydrazines by Metallic Oxides, Permanganates, and Chromates: F. D. Chattaway.—Studies in Fermentation. II. The Mechanism of Alcoholic Fermentation: A. Slator.—Organic Derivatives of Silicon. Part IV. The Sulphonation of Benzylethylpropylsilicyl Oxide and of Benzylethyldipropylsilicane: H. Marsden and F. S. Kipping.—The Formation and Reactions of Imino-compounds. Part VI. The Formation of Derivatives of Hydrindene from *o*-Xylylenedinitrile: C. W. Moore and J. F. Thorpe.

FRIDAY, JANUARY 17.

ROYAL INSTITUTION, at 9.—The Centenary of Davy's Discovery of the Metals of the Alkalis: Prof. T. E. Thorpe, C.B., F.R.S.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Third Report to the Gas-Engine Research Committee: Prof. F. W. Burstall.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Principles of Engineering Geology: Dr. Herbert Lapworth.

SATURDAY, JANUARY 18.

ROYAL INSTITUTION, at 3.—The Electrification of Railways: Prof. Gisbert Kapp.

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